ART-VERSES BY MICHELANGELO.

Your fragment of Goethe's, on Transcendentalism in Art, brought to my mind something of a similar strain of thought, conveyed in two sonnets by one of the greatest masters, Michelangelo himself. The reader who remembers the saying of "the Great Michael" that *he had no other mistress but Art*, will not be surprised to find him addressing her in the tones of a lover.

LE BELLEZZE MONDANE SONO SCALA AL FATTORE.

Dimmi di grazia, amor, se gli occhi miei
Veggono il ver della beltà ch'io miro,
O s'io la ho dentro il cor; ch'ovunque io giro,
Veggio più bello il volto di costei.

Tu'l dei saper, poichè tu vien con lei
A tormi ogni mia pace, ond'io m'adiro:
Benchè nè meno un sol breve sospiro,
Nè meno ardente foco chiederei.

La beltà che tu vedi, è ben da quella;
Ma cresce poi ch'a miglior loco sale,
Se per gli occhi mortali all' alma corre.

Quivi si fa divina onesta e bella,
Come a se simil vuol cosa immortale,
Questa, e non quella, agli occhi tuoi precorre.

La forza d'un del volto, al ciel mi sprona
(Ch' altro in terra non è che mi diletti)
E vivo ascendo tra gli spirti eletti,
Grazia ch' ad nom mortal raro si dona.

Si ben col suo Fattore l'opra consuona,
Ch' a lui mi levo per divin concetti;
E quivi informo i pensier tutti e i detti,
Ardendo, amando per gentil persona.

Onde se mai da due begli occhi il guardo
Torcer non so, conosco in lor la luce
Che mi mostra la via ch'a Dio mi guide.

E se nel lume loro acceso io ardo,
Nel nobil foco mio dolce riluce
La giojia che nel cielo eterna ride.

EARTHLY CHARMS ARE STEPS TO OUR MAKER.

In pity tell me, love, if that mine eyes
See soothly all the beauty I admire,
Or if I hold it in my heart; a higher
And purer grace thus giving her I prize.

Thou ought'st to know, who'rt with her when she lies
In wait to rob my peace, my patience tire:
Albeit I would not cool that wasting fire,
Nor lose, oh love! the least of all my sighs.

The beauty which thou see'st is all her own,
But waxeth greater as it rises higher,
If, through the eye, it do the soul inspire;

So that what was but fair, divine hath grown
Even as immortal things their like require;—
This, and not that, it is thou dost admire.

The force of a fair face lifts me to heaven
(For on this earth none other I admire),
And I ascend among the heavenly quire,
A grace to mortal man but rarely given.

The work doth with its Maker chime so even,
That by divine conceits it lifts me nigher
To Him, and I a purer air respire,
By love made clean of every earthly leaven.

Whence I do know, if e'er from two sweet eyes
I cannot turn away, that in them lies
A light, to show the way to God and love;

And if I burn, enkindled by that light,
Oh then, from that sweet fire reflected bright
I see the eternal joy that laughs above.

M. MacD.

SMOKE NUISANCE.*

To ensure satisfactory operation, and the suppression of smoke, the extreme—not the nominal—power of the steam-engine should be taken as the datum: from this, by the accustomed formulæ, the boiler capacity should then be found, and, from the latter, the fire area; but form and disposition are of prime importance in the boiler; and the area of its heat-receiving surface, in fire-grate and flues, is understood, as regards its generative power, to be of more consequence than its cubical capacity. The parity of the former in square, to the latter in cubic, feet, is said to afford the most satisfactory results, economy included; while the areas of the fire-grate and flue surfaces are considered to be most efficient when proportioned to each other in the ratio of 1 to 8. Where this proportion of recipient surface does not exist, it should be brought about, as near as may be, by alteration.

With no air-supply excepting through the fire-grate, the great bulk of the gases arising from each fresh charge of fuel, with their accompaniment of uninflamed carbon, must necessarily escape through the flues, and issue in volumes of dark smoke from the chimney, unless, indeed, a greater degree of care in firing be exercised by the stoker than can be hoped for in common practice; and then, the continual firing at short intervals under such circumstances, to obviate the smoke, would be unattended with the desired economy; seeing that the lowering the temperature of the furnace, through the absorption of heat by the cold fuel, and by the hardly-intermittent current of cold air admitted through the door-opening, would have a retarding effect on the boiler, that would call for a greater consumption of fuel.

While putting together these remarks, we have had before us two pamphlets; one, "On the Construction of Boilers, Consumption of Fuel, and Prevention of Smoke," by William Fairbairn, C.E., F.R.S.;* the other on "The City Smoke-prevention Act, with Suggestions on the use of Smoke-consuming Furnaces," by W. Keld Whytehead, C.E.;† to both of which we can refer the reader for scientific and practical instructions on these important subjects. To Mr. Fairbairn's admirable pamphlet we refer him for lucid information as to the gases eliminated by coal in a state of combustion, and the equivalents of atmospheric air requisite to support the same, as well as much valuable tabulated information as to the constituents and calorific powers of a great variety of coals. On the cylindrical boiler, with two furnaces and flues, the following extract will be of interest:—

"Irrespective of the changes of form and management of boilers which are in progress, it may be proper to notice a still further improvement in construction, which has recently taken place: and where a still greater economy is effected. This is a mean between the Cornish single-flue boiler and the tubular boiler: it is perfectly cylindrical, and contains two circular flues, varying from 2 ft. 6 in. to 2 ft. 9 in. diameter, extending throughout its whole length. * * * Towards the front end, the flues are made slightly elliptical, in order to receive the furnace grate-bars, hearth-plates, &c., to give sufficient space over the fire, and to admit a free current of air under the ash-pit. On this plan it will be observed that each furnace is surrounded by water in every direction, with large intermediate spaces to allow a free circulation of the water, as the globules of heat rise from the radiant surface over the fires, and the other intensely-heated parts of the flues. Another advantage is the position of the receptacle for the sedimentary deposits, which do not take place over the furnace, as in the old construction, but in the lower region of the boiler, where the temperature is lowest,—thus affording greater security from incrustation, and other causes of an injurious tendency."

In the boiler here described, the two furnaces are fed alternately; and the gases emitted flow along the flues, and only unite at its extreme end.

"At this point a change immediately takes place in the gaseous products, and that from one of two causes, as follows: Suppose the one furnace to be newly fired, and the fuel in it [not being] in a perfectly incandescent state, it then follows that the gases passing from the other furnace will not only be different in their constituents to those from the first, but they are at a much higher temperature; and both furnaces having received air as a constant quantity through the fixed apertures [under the bridges], it will be seen that, in the event of a surcharge of air on one side and a diminished supply on the other, that their extremes are neutralised by the excess of oxygen thus introduced, and the increased temperature which effects ignition at the point [at the extreme end of the boiler] where combination takes place. All that is therefore necessary is to replenish the fires alternately every twenty minutes, in order to effect the combustion of the gases without the least appearance of smoke. These, and the recipient surface, are the leading properties of this boiler, which, compared with others having single flues, is found to be greatly superior either as regards the combustion or the economy of fuel."

On this form of boiler Mr. Whytehead remarks (with some difference of opinion) as follows:—

"*Messrs. W. and J. Galloways' Patent Boilers.*—These boilers consist of a cylindrical shell or outer case, containing two cylindrical tubes forming the furnaces. These two tubes *unite behind the fire-bars* in a single chamber; and it is in this union that their virtue as smoke-consumers consists. The ordinary double-furnaced boilers in use in the manufacturing districts are defective smoke-consumers, inasmuch as the two furnace-tubes extend the whole length of the boiler: so that the products of combustion do not meet until their temperature has been reduced below the point of ignition. Extended experience proves that, as economic evaporators, Messrs. Galloways' boilers hold a high rank."

Mr. Whytehead's strictures on hand and machine firing will be found sound and practical: we quite concur in the importance attached, both by him and Mr. Fairbairn, to the duties of the stoker; and in the opinion that he should be paid, not according to the quantity of coals shovelled on the fire, but the amount of saving effected.

From Mr. Fairbairn's pamphlet we extract the following neat calculations, forming data for determining the sectional area of the flue,—quoted by him from a paper "On the Construction and proper Proportion of Boilers for the Generation of Steam," communicated to the Institution of Civil Engineers by Mr. Andrew Murray, of the Royal Dockyard, Woolwich:—

"Mr. Murray states that 'The quantity of air chemically required for the combustion of 1 lb. of coal has been shown to be 150·35 cubic feet, of which 44·64 enter into combination with the gases, and 105·71 with the solid portion of the coal. From the chemical changes which take place in the combination of hydrogen with oxygen, the bulk of the products is found to be to the bulk of the atmospheric air required to furnish the oxygen, as 10 is to 11. The amount is, therefore, 49·104. This is without taking into account the augmentation of the bulk due to the increase of the temperature. In the combination which takes place between the carbon and the oxygen, the resultant gases (carbonic acid gas and nitrogen gas) are of exactly the same bulk as the amount of air, that is, 105·71 cubic feet, exclusive, as before, of the augmentation of bulk from the increase of temperature. The total amount of the products of combustion in a cool state would, therefore, be 49·104 + 105·71 = 154·814 cubic feet.

The general temperature of a furnace has not been very satisfactorily ascertained, but it may be stated at about 1,000° Fahrenheit, and at this temperature the products of combustion would be increased, according to the laws of the expansion of aëriform bodies, to about three times their original bulk. The bulk, therefore, of the products of combustion which must pass off must be 154·814 × 3 = 464·442 cubic feet. At a velocity of 36 feet per second,* the area, to allow this quantity to pass off in an hour, is ·516 square inch. In a furnace in which 13 lbs. of coal are burnt upon a square foot of grate per hour, the area to every foot of grate would be ·516 × 13 = 6·708 square inches: and the proportion to each foot of grate, if the rate of combustion be higher or lower than 13 lbs., may be found in the same way.

This area having been obtained, on the supposition that no more air is admitted than the quantity chemically required, and that the combustion is complete and perfect in the furnace, it is evident that this area must be much increased in practice where we know these conditions are not fulfilled, but that a large surplus quantity of air is always admitted. A limit is thus found for the area over the bridge or the area of the flue immediately behind the furnace, below which it must not be decreased, or the due quantity could not pass off, and, consequently, the due quantity of air could not enter, and the combustion would be proportionally imperfect. It will be found advantageous in practice to make the area 2 square inches instead of ·516 square inch. The imperfection of the combustion in any furnace, when it is less than 1·5 square inch, will be rendered very apparent by the quantity of carbon which will rise unconsumed along with the hydrogen gas, and show itself in a dense black smoke on issuing from the chimney. This would give 26 square inches of area over the bridge to every square foot of grate in a furnace in which the rate of combustion is 13 lbs. of coal on each square foot per hour, and so on in proportion for any rate. Taking this area as the proportion for the products of combustion immediately on their leaving the furnace, it may be gradually reduced as it approaches the chimney, on account of the reduction in the temperature, and, consequently, in the

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* See page 53, *ante*.

* London: Simpkin, Marshall, and Co.; and John Weale. 1851.

† London: John Weale. 1851.

* See Dr. Fyfe's experiments, read before the Royal Society, June 1838.